Liquid-Liquid Extraction Standard Laboratory Module (SLM™)

General Overview of the Liquid-Liquid Extraction SLM

The instrument is a new and radical change from the manual method of performing liquid-liquid extraction. Operation of the ExCell™ uses RF (radio frequency) fields to disburse the extraction solvent into micro-sized droplets, which extract contaminants from a sample in a water matrix.

Environmental Protection Agency (EPA) Method

The instrument is designed to perform the following USEPA Methods: 3510 (SW-846 Third Edition, September 1986) "Separatory Funnel Liquid-liquid Extraction" and 3520 (SW-846 Third Edition, September 1986) "Continuous Liquid-liquid Extraction."

Standard Analysis Method (SAM)

This SLM would support several Organic SAM systems processing samples in a liquid matrix.

Advantages

The action of the instrument shortens the usual liquid-liquid extraction time from 16-24 hours to less than 2 hours. As a result of the unique extraction method, much less solvent is required for the extraction, and waste products are minimized. The operation also greatly reduces the risk of chemical exposure to laboratory personnel.

General Description of the Liquid-Liquid Extraction SLM

The Liquid-Liquid Extraction SLM is an adaptation of a commercial instrument, the ABC Instruments' ExCell™ to operate under the Contaminant Analysis Automation (CAA) SLM paradigm. Alteration of the ExCell™ to comply with CAA SLM protocols required several modifications. Communication with the task sequence controller (TSC) was established to allow it to control the SLM. This permits the passage of instructions, including information on operating parameters, to the instrument. Status information between the ExCell™ and the TSC are also required. Specific sample information is sent through the TSC to the database for chain-of-custody logging. The handling of samples by a transport robot is required. This involves adding a face plate to each of the sample trays to allow the robot to pick them up from the queue and place them into the ExCell™. Solenoids are installed on the manual latch mechanism of each sample cell to give the onboard controller the ability to unlatch the trays on command.

RN95-053-003

Figure 1. The Liquid-liquid Extraction SLM.

Status

This is a commercially available instrument. Modifications are being made to implement CAA standards to allow the instrument to operate as an SLM.

Industrial Partners

ABC Instruments and SciBus Analytical, Inc.

Developers

The Department of Energy laboratory responsible for Liquid-Liquid Extraction SLM development is Pacific Northwest Laboratories.

Battelle
Pacific Northwest Laboratories

INEL

Los Alamos
NATIONAL LABORATORY

ornl

Sandia
National
Laboratories

University of Florida
University of Tennessee
University of Texas

LALP-95-83
April 1995

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the University of California for the U.S. Department of Energy under contract W-7405-ENG-36.

All company names, logos, and products mentioned herein are registered trademarks of their respective companies. Reference to any specific company or product is not to be construed as an endorsement of said company or product by the Regents of the University of California, the United States, the U.S. Department of Energy, nor any of their employees.

Los Alamos
NATIONAL LABORATORY

Los Alamos, New Mexico 87545

A U.S. DEPARTMENT OF ENERGY LABORATORY